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(54) A motor vehicle lifting device, particularly for vehicle bodies.

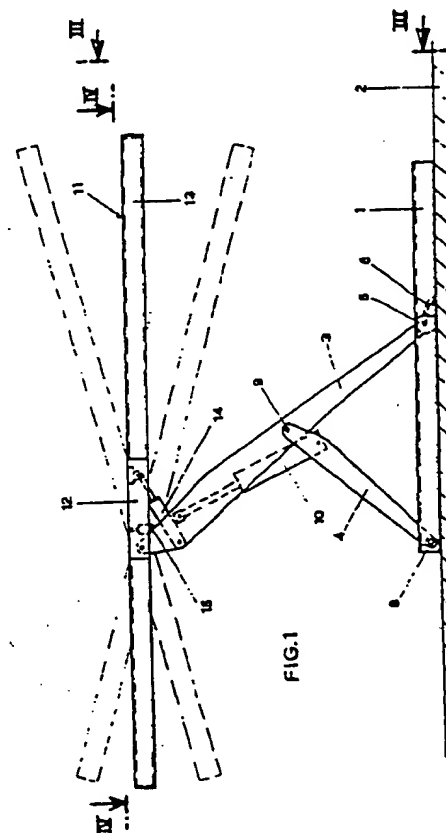
(57) A motor vehicle lifting device, particularly for vehicle bodies, characterised by comprising:  
- a base (1) in the form of a single longitudinal member to be rested on and/or secured to the floor (2),

- a pair of uprights (3,4) articulatedly secured to said base (1) at their lower end and hinged together about a horizontal axis (9), the end of one (3) of said uprights being slidable along said base,

- a vehicle support and securing frame (11) hinged to the upper end of at least one (3) of said uprights,

- at least one first actuator (10) associated with said uprights (3,4) to vary the angle formed between them and thus raise said frame (11) above said base, and

- at least one second actuator (14,15) associated with said frame (11) to vary its inclination to the horizontal plane in the longitudinal and/or transverse direction.



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# A Motor vehicle Lifting device, particularly for vehicle bodies.

This invention relates to a motor vehicle lifting device, particularly for vehicle bodies.

Motor vehicle lifting devices are known and enable mechanics to work under the vehicle lifted in this manner. Devices of this kind are used in vehicle repair shops, body shop, service stations, tyre fitting centres etc.

Particularly in the case of vehicle bodies, lifting devices are known consisting essentially of a lift comprising four columns along which a frame on which the vehicle can be raised is vertically mobile. The templates of a conventional shaping bed can be applied to this frame. All is well known, the purposes of these templates is to check whether there are deformations in the body of a vehicle which has been involved in an accident, and to remove them if present.

To restore the shape of a damaged vehicle body it must be possible to exert tension or pressure on the body by suitable actuator members fixed to the bed, with the result that perfect restoration can only be obtained if there is maximum freedom to fix these at any point of the body and at any point of the bed, and is therefore hindered by the presence of the columns of the lifting device.

Moreover, in body repair work the parts to be repaired must be presented to the repairer in a proper manner to enable such repair work to be carried out directly on the body under comfortable conditions.

The invention relates to a motor vehicle lifting device, particularly for vehicle bodies, characterised by comprising:

- a base in the form of a single longitudinal member to be rested on and/or secured to the floor,
- a pair of uprights articulatedly secured to said base at their lower end and hinged together about a horizontal axis, the end of one of said uprights being slidable along said base,
- a vehicle support and securing frame hinged to the upper end of at least one of said uprights,
- at least one first actuator associated with said uprights to vary the angle formed between them and thus raise said frame above said base, and
- at least one second actuator associated with said frame to vary its inclination to the horizontal plane in the longitudinal and/or transverse direction.

The present invention is described in detail hereinafter with reference to the accompanying drawings in which:

Figure 1 is a side view of a lifting device according to the invention in its raised position;

Figure 2 shows it in the same view as Figure 1 but in the lowered position;

Figure 3 is a front view thereof on the line III-

III of Figure 1;

Figure 4 is a plan view thereof on the line IV-IV of Figure 1;

Figure 5 is a front view of a modified embodiment thereof; and

Figure 6 is a side view thereof on the line VI-VI of Figure 5.

As can be seen from the figures the lifting device according to the invention comprises a base 1 to be rested on and/or secured to the floor 2. On the drawings this base is shown simply resting on the floor, but the invention provides for it to be also secured to the floor, for example by foundation bolts, or alternatively it can be housed in a suitable recess in the floor, so that as will be apparent hereinafter the lift allows the vehicle to be positioned on the lifting frame without requiring runways and upward ramps, which are difficult to use if the vehicle is without its engine.

The base 1 preferably consists of a C-shaped metal section with its opening facing upwards and its longitudinal edges bent horizontally inwards. Two unequal uprights 3 and 4 are retained on the base 1 at their lower end.

Specifically, the upright 3, of length substantially double the length of the upright 4, is provided at its lower end with a pair of rollers 5 by which said end can slide along the base 1 between its longitudinal edges. At the same end there is provided a conventional safety device consisting of a pawl 6 removably engageable in a series of teeth 7 provided on the bottom of the base 1.

The upright 4 which, as stated, has a length substantially equal to one half the length of the upright 3, is hinged at its lower end to the base 1 by a fixed horizontal pin 8, and is also pivoted at its upper end on a horizontal pin 9 fixed to the upright 3 at a central position thereof.

Between the two uprights 3 and 4 there is disposed an actuator, consisting for example of a hydraulic double-acting cylinder-piston unit 10, the purpose of which is to vary the angle between the two uprights 3 and 4 to thus raise and lower a support frame 11 for the vehicle.

The frame 11 is in fact formed from an inner plate 12 directly hinged to the upper end of the upright 3, and a framework 13 for securing the vehicle.

The framework 13 is connected to the plate 12 along their adjacent longitudinal sides, the connection, in the form of a disengageable hinged connection, being made by a simple manually operated catch or an automatic mechanically operated pin. In all cases the two pairs of longitudinal sides can also be both engaged simultaneously, to keep the

framework 13 locked to the plate 12.

Between the plate 12 and the upright 3 there are interposed a further two actuators 14 in the form of hydraulic cylinder-piston units with their axes parallel, their purpose being to incline the frame 11 to the horizontal plane in the longitudinal direction, as will be apparent hereinafter.

Between the plate 12 and the framework 13 there is interposed a hydraulic cylinder-piston unit 15 of vertical axis, the purpose of which is to laterally incline the framework 13 relative to the plate 12 about one of the two hinged pairs of sides when the connection on the opposite side has been released.

To the two longitudinal edges of the framework 13 there are applied two runways 16 to enable the vehicle to climb on. They consist of two plates which can either be permanently connected to the framework 13, in which case they will be hinged to it so that they can be folded towards the base when the body repairers are working on the vehicle, ie when they are not in use, or be removably connected to said framework, in which case they can be removed when not in use.

Connectors are also provided in the framework 13 for the templates which overall form the so-called "dummy frame" for the various vehicle types, ie those structures having fixed reference and locator points for the various vehicle types, to allow verification of the correct body shape or to remove any accident-derived deformation. As the templates and the method for connecting them to the framework 13 are of conventional type they have been omitted from the drawings for simplicity of representation.

All the actuators for the device according to the invention are fed from a central unit which can be external or be mounted on the device, however the various components and their connections do not form part of the invention and are also omitted from the drawings for clarity of representation.

The lifting device according to the invention operates as follows:

when the lift is lowered (see Figure 2) the frame 11 practically rests on the base 1 with the runways 16 connected to the framework 13 and slightly inclined forwards analogously to this latter, to allow the use of short inclined ramps 17 preferably of removable type, to enable the vehicle to climb on.

After the vehicle on which body repairs are to be carried out has climbed onto the runways 16, it is fixed to the templates which have been previously fitted to the framework 13. These templates are those designed for the particular vehicle concerned, and if the vehicle has not been deformed the fixing will be a very simple and rapid task. If however the vehicle body has been deformed the original shape must be restored, this being done

by conventional systems.

When the vehicle body has been fixed to the templates the runways 16 can be folded downwards or removed, giving the body repairer more easy access to the lower parts of the vehicle.

To facilitate work on the body, the cylinder-piston unit 10 is fed to raise the lift. During this stage the outlet of the cylinder-piston unit 10 can be directly connected to the inlet of the cylinder-piston units 14, so that the oil which is discharged by the piston of the cylinder-piston unit 10 during its elongation causes the cylinder-piston units 14 to extend. By correctly sizing the various parts and correctly choosing the points of thrust, this "series" feed of the cylinder-piston units 10 and 14 results in translational movement of the frame 11.

By interrupting the connection between the cylinder-piston unit 10 and the cylinder-piston units 14 and feeding these latter directly, it is possible to vary the longitudinal inclination of the frame 11 and of the vehicle disposed on it and fixed to the templates.

Suitable limit switches (not shown) prevent the frame 11 inclining beyond a predetermined maximum safety value.

If the specific body repairs require it, it is also possible to incline the vehicle laterally. To do this it is firstly necessary to disengage the hinge between the plate 12 and framework 13 on the side opposite that towards which the vehicle is to be inclined. The vertical cylinder-piston unit 15 is then fed to cause the framework 13 to incline laterally to the plate 12, which remains horizontal.

Again in this case, suitable safety devices prevent simultaneous disengagement of both the hinges and also prevent operation of the disengagement system when the frame 11 is laterally inclined.

From the foregoing it is apparent that the lifting device according to the invention is suitable for use in workshops and service stations in general, but is particularly advantageous for use in vehicle body shops because of the facility for inclining the vehicle in any direction when it has been lifted and its body fixed to the templates fitted to the lifting frame 11, and consequently because those body parts which require repair can now be presented properly to the repairer.

Because of its particular configuration the device of the invention occupies a small overall size and enables repairers to move comfortably about the raised vehicle under conditions of total freedom and absence of obstacles.

Finally, because of the simple but robust construction system, the device of the invention combines the advantages of reliable and safe operation with extreme versatility and adaptability to almost any type of motor vehicle.

In the embodiment shown in Figures 5 and 6, the lifting device, which has the same basic characteristics as those described for the device of Figures 1 to 4, incorporates however some modifications which make it preferable for certain uses.

Firstly, this device has the central control unit, the electric motor, the solenoid valves and the relative electrical controls completely housed within the upright 4. In this manner the only connection between the device and the outside is an electric cable for powering the pump operating motor.

In this embodiment the base 1 is not designed to be rested on or secured to the floor 2, but instead is provided with wheels 18 to enable the lifting device to be transferred, and which as stated requires only a single electrical socket for its operation.

Furthermore, in this embodiment the cylinder-piston unit 10 is of the type provided with incorporated mechanical safety members, so dispensing with the need for the safety members 6 and 7 provided at the lower end of the upright 3 and in the base 1. A cylinder-piston unit provides with this type of safety system is described for example in the document EP-A2-0224914.

Finally, the framework 13 comprises a pair of C-shaped longitudinal members with their opening facing outwards and arranged to support clamps 19 in a longitudinally adjustable position, for securing the vehicle body.

## Claims

1. A motor vehicle lifting device, particularly for vehicle bodies, characterised by comprising:  
 - a base (1) in the form of a single longitudinal member to be rested on and/or secured to the floor (2),  
 - a pair of uprights (3,4) articulatedly secured to said base (1) at their lower end and hinged together about a horizontal axis (9), the end of one (3) of said uprights being slidable along said base,  
 - a vehicle support and securing frame (11) hinged to the upper end of at least one (3) of said uprights,  
 - at least one first actuator (10) associated with said uprights (3,4) to vary the angle formed between them and thus raise said frame (11) above said base, and  
 - at least one second actuator (14,15) associated with said frame (11) to vary its inclination to the horizontal plane in the longitudinal and/or transverse direction.

2. A lifting device as claimed in claim 1, characterised in that the lifting base (1) consists of a C-shaped section with its opening facing upwards.

3. A lifting device as claimed in claim 1, characterised in that the support base (1) is provided with wheels.

4. A lifting device as claimed in claim 1, characterised in that the lower end of the upright (3) slidable along the base (1) is provided with a pair of rollers (5).

5. A lifting device as claimed in claim 1, characterised in that the lower end of the upright (3) slidable along the base (1) is provided with safety members (6,7) which ensure that the raised configuration is maintained even in the case of sudden loss in the feed circuit of said first actuator (10).

6. A lifting device as claimed in claim 5, characterised in that the lower end of the upright (3) is provided with a locking member (6) cooperating with a plurality of stop teeth (7) provided on said base (1).

7. A lifting device as claimed in claim 1, characterised in that the first actuator (10) is of the type provided with incorporated mechanical safety devices.

8. A lifting device as claimed in claim 1, characterised in that the upright (3) with its end slidable along the base (1) has a length substantially double the length of the other upright (4), which is hinged at its lower end to the base (1) about a fixed horizontal pin (8) and its upper end about a pin (9) disposed substantially in a central position on the upright (3).

9. A lifting device as claimed in claim 1, characterised in that the first actuator (10) is interposed between the two uprights (3,4).

10. A lifting devices as claimed in claim 1, characterised in that the central hydraulic unit required for feeding the various actuators is housed within an upright (4).

11. A lifting device as claimed in claim 1, characterised in that the frame (11) comprises a plate (12) hinged to the upper end of at least one (3) of said uprights, and a framework (13) connected to said plate (12) in such a manner as to be able to be inclined laterally to it.

12. A lifting device as claimed in claim 11, characterised in that the framework (13) is provided with a pair of runways (16) to enable the vehicle to climb onto it, said runways being removable and/or downwardly foldable when not in use.

13. A lifting device as claimed in claim 11, characterised in that the plate (12) and the framework (13) are connected together along their corresponding longitudinal sides by disengageable hinges.

14. A lifting device as claimed in claim 13, characterised in that at least one actuator (15) of vertical axis is interposed between the plate (12) and framework (13) to laterally incline the frame-

work (13) to the plate (12) about one hinge after the other hinge has been disengaged.

15. A lifting device as claimed in claim 12, characterised in that the framework (13) comprises a pair of C-profiled longitudinal members along which vehicle securing clamps (19) can be positioned and locked.

16. A lifting device as claimed in claim 1, characterised by comprising a pair of actuators (14) symmetrically disposed about the longitudinal plane through the device, between at least one upright (3) and the frame (11).

17. A lifting device as claimed in claim 1, characterised in that provision is made for feeding the actuator (10) and actuator (14) in series in order to raise the frame (11) with substantially translation movement.

18. A lifting device as claimed in claim 1, characterised by being provided with limit switches which define the two end positions corresponding to maximum longitudinal inclination of the frame (11).

19. A lifting device as claimed in claim 1, characterised by being provided with means for defining the two end positions corresponding to maximum lateral inclination of the framework (13).

20. A lifting device as claimed in claim 14, characterised by comprising means for preventing simultaneous disengagement of the two hinges which connect the framework (13) to the plate (12).

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 240 947 (ROSSATO) * Page 3, lines 27-58; page 4, lines 1-56; page 7, lines 1-7; figures 1-12 *	1,2,4,5 ,6,8,9, 16	B 66 F 7/22 B 66 F 7/08
Y	---	7,11,12 ,13,14	
D,Y	EP-A-0 224 914 (ROSSATO) * Abstract; figures 1-4 *	7	
Y	---		
Y	DE-A-3 807 796 (MENGHIN) * Column 3, lines 39-51; column 4, lines 14-22 *	11,12, 13,14	
X	---		
X	US-A-3 844 421 (NIELSEN) * Column 1, lines 47-68; columns 2,3; column 4, lines 1-10 *	1,3,4,5 ,6,9	
A	---	17	
A	US-A-3 202 243 (SEWARD)		
A	---		
A	DE-A-3 519 820 (FUHR)		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	---		
A	FR-A-1 155 913 (GAILLET)		B 66 F
A	---		
A	FR-A-1 111 799 (EMAIN)		
A	---		
A	WO-A-8 706 569 (BRODMANN)		
A	-----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30-03-1990	Examiner VAN DEN BERGHE E.J.J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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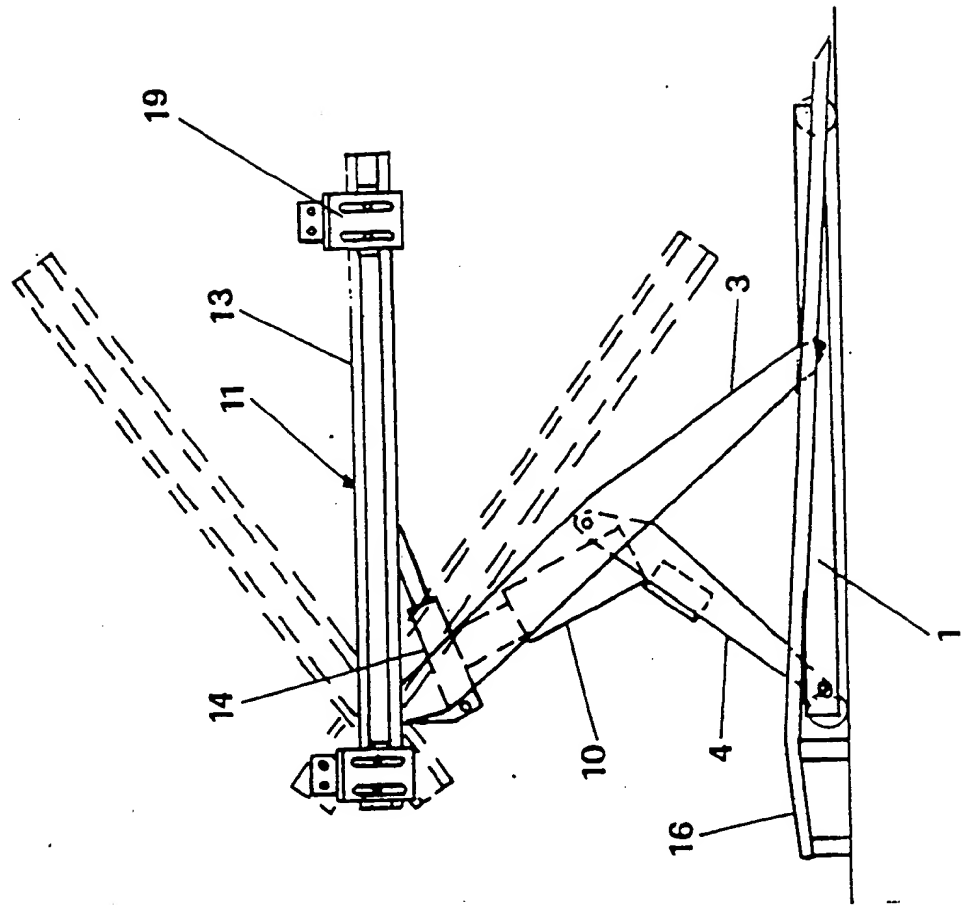


FIG. 6

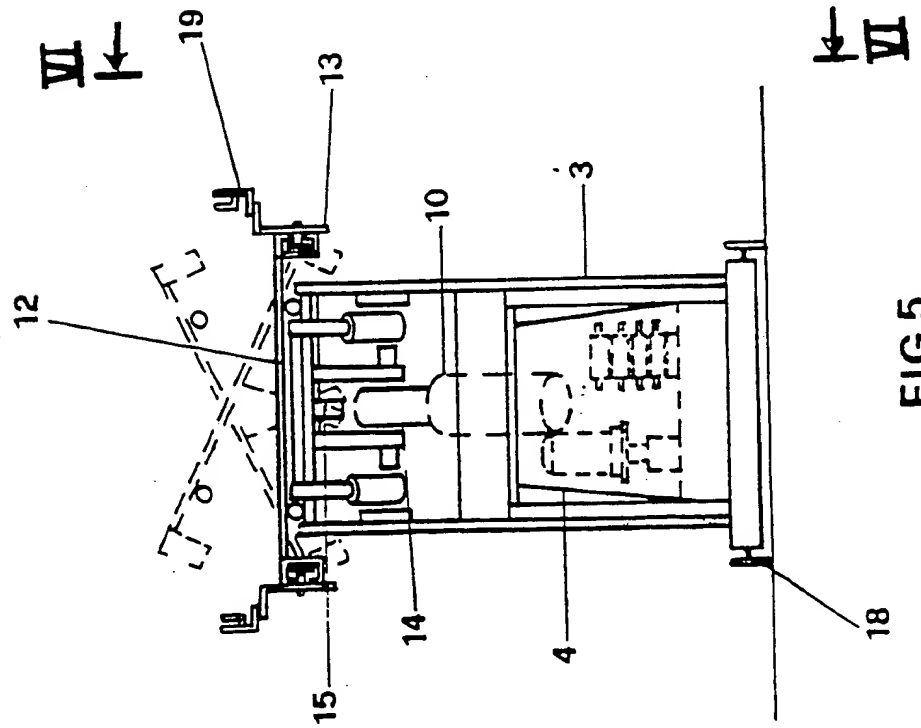


FIG. 5

*Runways*

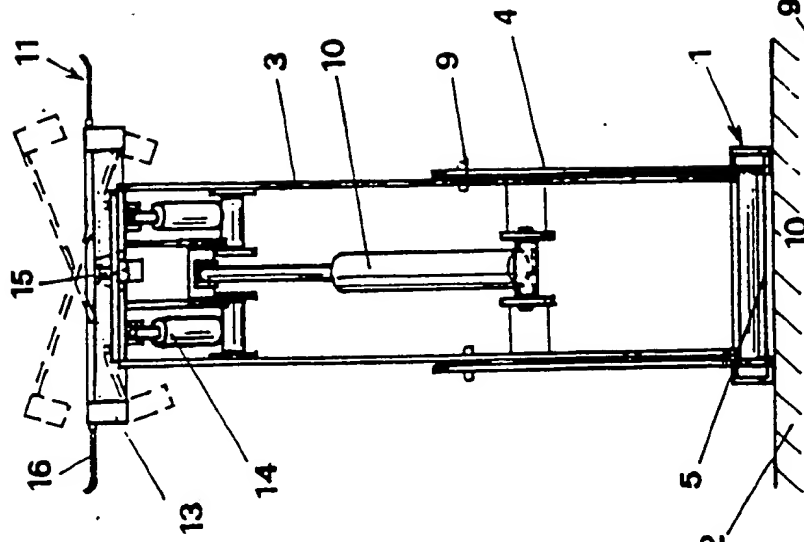
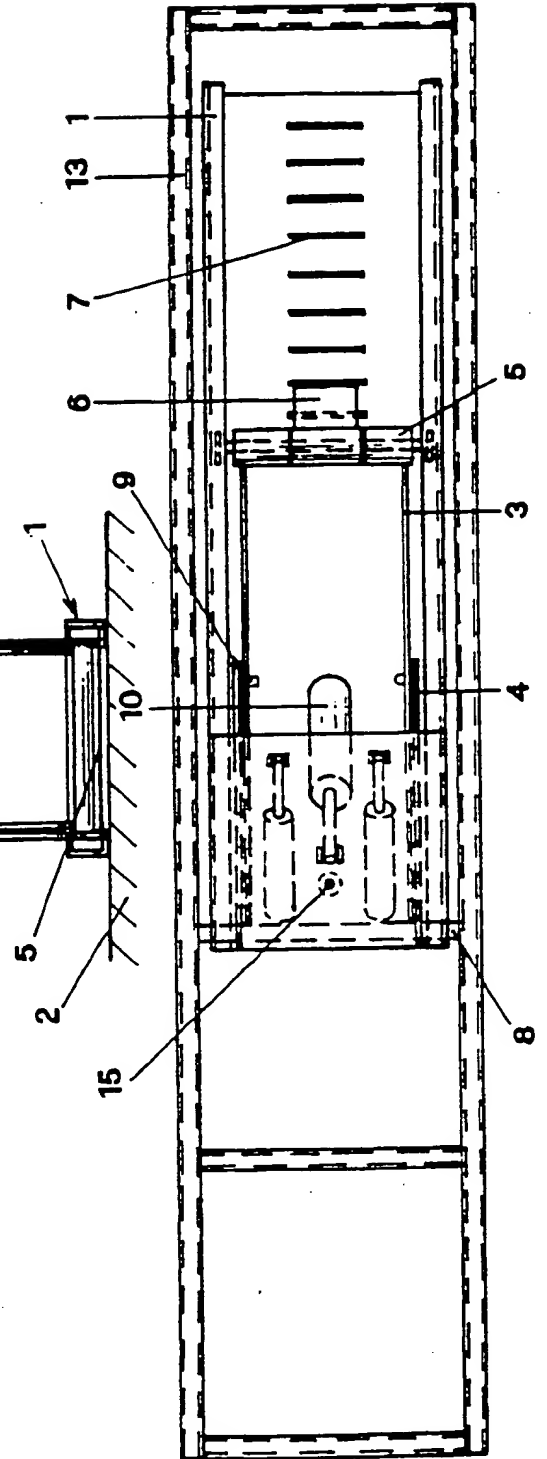
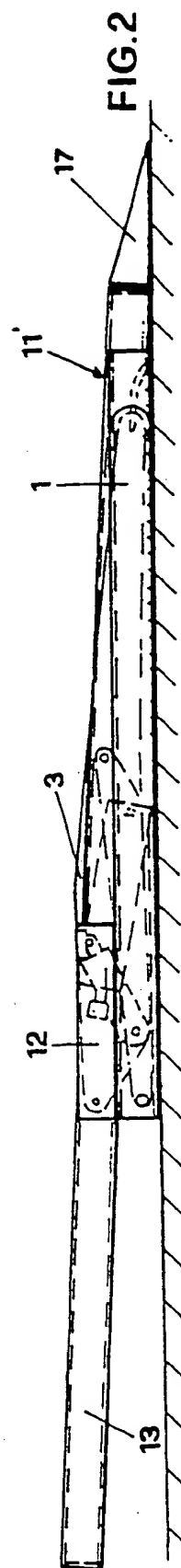
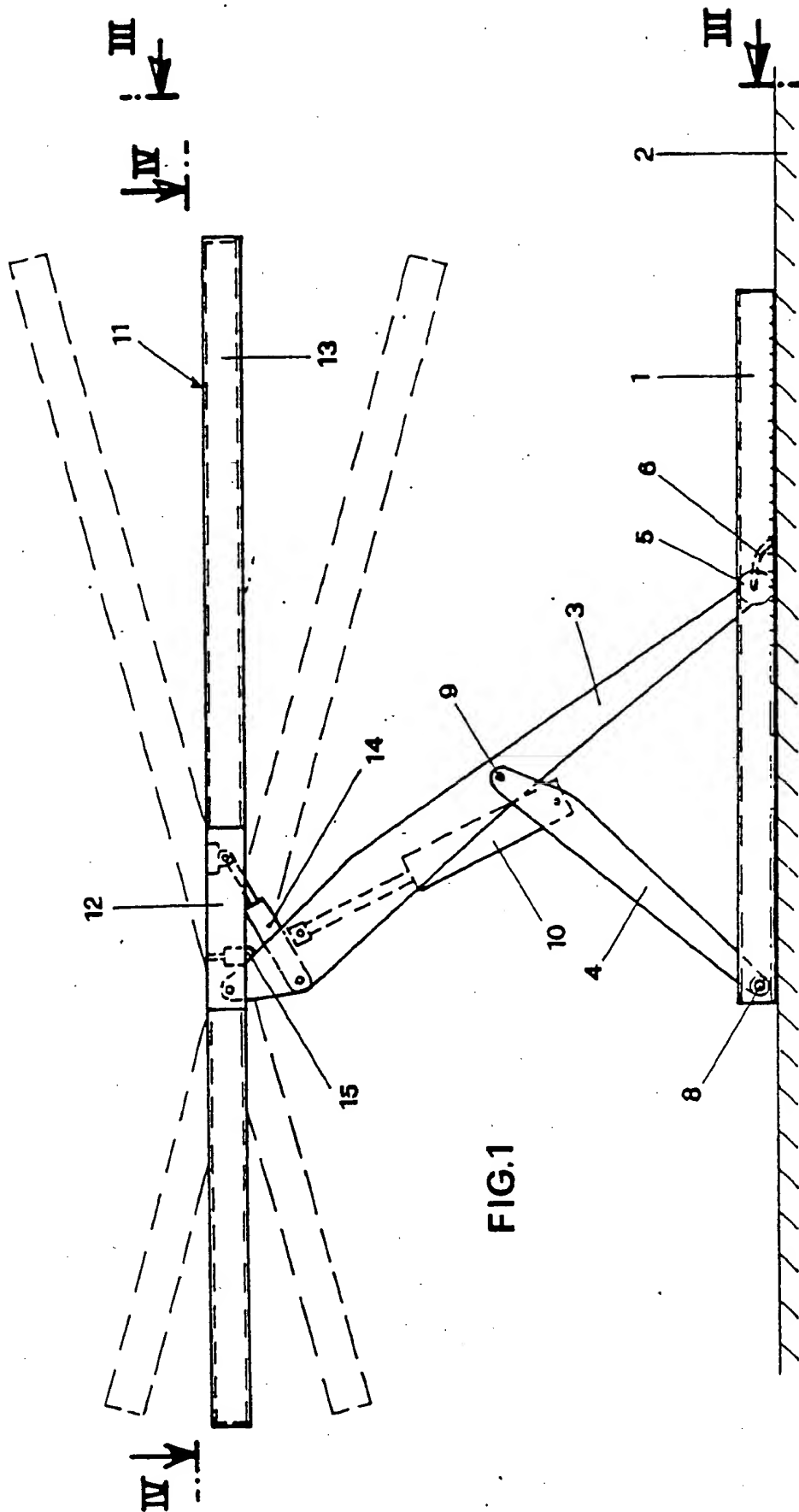


FIG.3

FIG.4





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